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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional): TSM03-0553

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on November 23, 2005

Signature

Typed or printed name AnneMarie James

Application Number	Filed
10/667,871	09/22/2003

First Named Inventor: Yeo, et al.

Art Unit	Examiner
2812	Jennifer Kennedy

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

- [ ] applicant/inventor.
- [ ] assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)
- [X] attorney or agent of record. Registration number 35,272
- [ ] attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34

Signature

Ira S. Matsil
Typed or printed name

972-732-1001
Telephone number

November 23, 2005
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

[X] *Total of 1 forms are submitted.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Yeo, et al.	Docket No.:	TSM03-0553
Serial No.:	10/667,871	Art Unit:	2812
Filed:	September 22, 2003	Examiner:	Kennedy, Jennifer M.
Title:	Resistor with Reduced Leakage		

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Dear Sir:

All claims have been finally rejected as being obvious over Nowak et al. (U.S. Patent No. 6,100,153, hereinafter "Nowak") in view of Yu et al. (U.S. Patent No. 6,784,101, hereinafter "Yu"), either in combination or in combination with other references. Applicant respectfully submits that the explicit teachings of Nowak and Yu teach away from the combination suggested in the Final Rejection.

1. Undisputed Facts

- Claim 60, the only independent claim, recites the formation of a resistor with (1) a dielectric layer comprising a material with a relative permittivity greater than 8 between (2) a resistor body and (3) a conductive top electrode.
- Neither Nowak nor Yu teach a structure that includes all three of these elements.

• Nowak's prior art Figure 1, and related discussion in lines 45-67 of column 1, illustrates a resistor with (1) a dielectric layer between (2) a resistor body and (3) a conductive top electrode.

• Nowak does not disclose that the dielectric layer comprises a material with a permittivity greater than about 8.

• Yu teaches a transistor that includes (1) a dielectric layer comprising a material with a relative permittivity greater than 8 between (2) a channel and (3) a gate electrode.

2. Issue

The issue in the application is whether or not it would have been obvious to one of ordinary skill in the art at the time of invention to modify the Nowak resistor structure to include a high-k dielectric as taught by Yu.

3. Discussion

The references themselves make it clear that such a combination would not be obvious. In fact, Nowak explicitly teaches away from such a combination.

Nowak teaches that there were two known types of buried resistors at the time of his invention. One of these is illustrated in Figure 1 and relied upon in the Office Action. Nowak explicitly teaches that this Figure 1 structure is undesirable because the polysilicon is highly doped, i.e., the top electrode comprises a conductive material, and thus "the parasitic capacitance of the buried resistor to polysilicon layer is high." Col. 1, lines 48-52. Nowak repeatedly teaches that low capacitance between the resistor body and the top electrode is desired. Col. 1, lines 31-33 (stating low gate capacitance is a desirable characteristic); col. 2, lines 19-22 (touting the invention because

it "reduces the parasitic diffusion-to-polysilicon capacitance"); col. 3, lines 8-15 (listing the advantages of the new design including "low parasitic diffusion to polysilicon gate capacitance").*

Given the very clear teachings of Nowak, Applicant respectfully submits that it would not be obvious to modify the structure disclosed therein in a manner that increases the capacitance between the buried resistor and the top electrode. It is uncontested, however, that a dielectric layer comprising a material with a relative permittivity greater than 8 included between the buried resistor and the top electrode will increase the capacitance, all other things being equal. Accordingly, Nowak teaches away from making this modification.

To support a rationale to combine the two references, the Final Rejection states that "[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to form the gate of Nowak et al. by the method of Yu et al. to form a high k dielectric layer because it allows for greater device speed with less gate-to-channel leakage current such that there is overall improved device performance (see Yu et al. column 2, lines 4-30)." A review of this section makes it clear that what may be improved transistor device performance for Yu is an undesirable characteristic for the resistor device of Nowak.

In particular, in the section cited in the Office Action, Yu states that "[t]he increased capacitance k (or permittivity ϵ) of the gate dielectric material advantageously results in an increase in the gate-to-channel capacitance, which in turn results in improved device performance." Col. 2, lines 19-22. This increased capacitance is precisely what Nowak teaches to avoid. In other words, Nowak explicitly teaches away from that which is taught by Yu, and thus combination of the references is improper. Since the references cannot be combined, the claims must be allowed.

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* Nowak's invention is to form an undoped top electrode thereby, *inter alia*, reducing the parasitic diffusion-to-polysilicon capacitance. *See* claim 1 (claiming the formation of a buried resistor); col. 2, lines 14-22 (reciting advantages of such a resistor).

These points were raised in an Amendment After Final Rejection. In response, the Advisory Action stated:

> Nowak et al. teaches that low parasitic capacitance is desired. The examiner points out that there is a distinction between parasitic capacitance (leakage) and capacitance. Parasitic capacitance or leakage current is unwanted current as understood by Applicant (see instant specification at [0005] and [0026]-[0028]). The combined reference Yu et al. teaches that the high-k dielectric reduces leakage current (see column 2, lines 1-5), and allows for thicker dielectric layers to be formed whereby both greater capacitance and device speed are obtained with less gate-to-channel leakage current (see column 2, lines 23-30). Thus, the high k dielectric of Yu et al. is also concerned with reducing the parasitic capacitance or leakage current and is combinable with Nowak et al.

Applicant respectfully submits that this discussion is off point. The question is whether it would have been obvious to one of ordinary skill in the art to modify the Nowak reference to include a high-k dielectric as taught by Yu. Nowak very clearly teaches that high capacitance between the resistor body and the top electrode is undesirable. Based on this unambiguous teaching of the reference, it would not be obvious to modify the structure in a way that increases the capacitance. This is a textbook case of teaching away from the invention.

Moreover, the Advisory Action's attempt to find a suggestion to combine in Applicant's own specification is improper. Paragraphs 26-28 provide teaching of using a high-k dielectric as claimed. These paragraphs also provide reasons why such a structure is desirable. These teachings cannot, however, be used to provide the suggestion to combine the two prior art references. This teaching must be provided by the prior art references.

The Advisory Action attempts to make a distinction between "capacitance" and "parasitic capacitance." It appears that the Advisory Action is implying that Nowak somehow teaches that the parasitic capacitance should be low but not the capacitance. Such a distinction is an absurdity. A "parasitic capacitance" is certainly a species in the broader class of "capacitance." Nowak's teachings make it clear that any capacitance increase between the relevant elements is undesirable.

Further, the Advisory Action's attempt to define "parasitic capacitance" as a leakage current is inaccurate. Although again not explicitly argued, the Advisory Action seems to be using the logic that since (1) Nowak teaches low parasitic capacitance, (2) Yu teaches low leakage current and (3) the present application defines parasitic capacitance to be the same as leakage current, then the references must be combinable. While the first two conclusions are true, the third is completely untrue.

The specification never defines parasitic capacitance to be the same as leakage current. In fact, the Detailed Description never uses the term "parasitic capacitance." The only use of the term is found in Paragraph 5 in the Background, which states that "[r]esistors should also have low parasitic capacitance." This background statement is consistent with the teachings of Nowak.

As a final point, the Advisory Action concludes that "the high k dielectric of Yu et al. is also concerned with reducing the parasitic capacitance or leakage current and is combinable with Nowak et al." This statement ignores the explicit teaching of Nowak. Nowak very explicitly teaches minimizing the capacitance between the two regions. This teaching is not changed by the present application's teaching of a configuration where the capacitance is increased, albeit as a byproduct of the reduction of leakage current. On the contrary, it merely illuminates the fact that the resistor of the present invention is different than the resistor taught by Nowak. This difference is precisely why the claims are patentable.

Respectfully submitted,

November 23, 2005
Date

Ira S. Matsil
Attorney for Applicant
Reg. No. 35,272